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February 21, 1856.

The LORD WROTTESELEY, President, in the Chair.

The following communications were read :—

- I. "On the Thermal Effects of Fluids in Motion." By Professor WILLIAM THOMSON, F.R.S., and J. P. JOULE, Esq., F.R.S. Received February 11, 1856.

A very great depression of temperature has been remarked by some observers when steam of high pressure issues from a small orifice into the open air. After the experiments we have made on the rush of air in similar circumstances, it could not be doubted that a great elevation of temperature of the issuing steam might be observed as well as the great depression usually supposed to be the only result. The method to obtain the entire thermal effect is obviously that which we have already employed in our experiments on permanently elastic fluids, viz. to transmit the steam through a porous material and to ascertain its temperature as it enters into and issues from the resisting medium. We have made a preliminary experiment of this kind which may be sufficiently interesting to place on record before proceeding to obtain more exact numerical results.

A short pipe an inch and a half diameter was screwed into an elbow pipe inserted into the top of a high pressure steam-boiler. A cotton plug placed in the short pipe had a fine wire of platina passed through it, the ends of which were connected with iron wires passing away to a sensitive galvanometer. The deflection due to a given difference of temperature of the same metallic junctions having been previously ascertained, we were able to estimate the difference of temperature of the steam at the opposite ends of the plug. The result of several experiments showed that for each lb. of pressure by which the steam on the pressure side exceeded that of the atmo-

sphere on the exit side there was a cooling effect of 0·2 Cent. The steam, therefore, issued at a temperature above 100° Cent., and, consequently, *dry*; showing the correctness of the view which we brought forward some years ago* as to the non-scalding property of steam issuing from a high pressure boiler.

II. "On the Bromide of Titanium." By F. B. DUPPA, Esq.
Communicated by A. W. HOFMANN, Ph.D., F.R.S. &c.
Received February 14, 1856.

A comparison of the boiling-points of corresponding chlorine and bromine compounds, led Prof. Kopp to the interesting discovery, that on the average their boiling-points rise 32° C for every equivalent of bromine which is substituted for an equivalent of chlorine.

	Boiling-point.	Difference.
Chloride of ethyl, C_4H_5Cl	11° C.	} 30.
Bromide of ethyl, C_4H_5Br	41° C.	
Dichlorinetted ethylene, $C_4H_4Cl_2$	67° C.	} $66 = 2 \times 33.$
Dibrominetted ethylene, $C_4H_4Br_2$	133°·6 C.	
Terchloride of phosphorus, $P Cl_3$.	78° C.	} $97 = 3 \times 32\frac{1}{3}.$
Terbromide of phosphorus, $P Br_3$.	175° C.	

If this difference be constant for all chlorine and bromine compounds, it becomes obvious that very important inferences in respect to the atomic constitution of these substances may be derived from the determination of their boiling-points. This result has, in fact, been happily applied by Prof. Kopp, as a criterion to determine the equivalent of silicium, a matter of such uncertainty as to have led to the admission of not less than three formulæ for silica—



From the difference between the boiling-points of chloride (59° C.)

* See letter from Mr. Thomson to Mr. Joule, published in the Philosophical Magazine, Nov. 1850.